The State of Maker Learning Today

October 2021

A Collaboration Between

Digital Promise®
Accelerating Innovation in Education

and

MAKER ED

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Five Years Ago...

In June 2016, President Obama formally proclaimed a renewed commitment to what many consider the hallmarks of American society: ingenuity, creativity, and technological innovation. At the heart of this proclamation was an acknowledgment that many citizens—particularly those from historically under-resourced communities—have not had equitable access to the technologies, mentors, and funding that making requires.

> *"During National Week of Making, we recommit to sparking the creative confidence of all Americans and to giving them the skills, mentors, and resources they need to harness their passion and tackle some of our planet's greatest challenges."*
>
> *—President Obama*

FULFILLING THE MAKER PROMISE

The Maker Promise challenged individuals and organizations to join the maker learning movement and commit to being champions for making. As maker champions, these individuals also contributed to the broader maker learning field by providing their insights through our *Fulfilling the Maker Promise* surveys. The corresponding reports helped lay the groundwork for our years-long partnership and this *State of Maker Learning Today* report.

Fulfilling the Maker Promise: Year One
Fulfilling the Maker Promise: Year Two

In response to the President's call to action, Digital Promise and Maker Ed announced the Maker Promise: a commitment made by school leaders, in-school and out-of-school educators, and community advocates to bring quality making experiences to all students. By signing the Promise, individuals signaled their recognition that equitable access to making opportunities and learning experiences is critical. These "Maker Champions" committed to becoming advocates for making learning, supporting opportunities and spaces for making, and showcasing what students make.

In the first two years, alone, more than 2,000 maker champions committed to advocating and creating the conditions for robust, equitable maker learning experiences. Representing individual classrooms, schools, youth makerspaces, and entire school districts, the maker champions' commitments and hard work have positively impacted hundreds of thousands of learners. Five years later, the educational Maker Movement continues to bring Powerful Learning experiences to learners of all ages across K-12, out-of-school time (OST), and higher education institutions.

MAKER LEARNING IS POWERFUL LEARNING BECAUSE IT IS...

Personal and Accessible: effective maker learning experiences provide learners with opportunities to invest in and make decisions about their path and product

Authentic and Challenging: learners' projects serve their communities and prepare them to become the next generation of leaders and changemakers

Collaborative and Connected: learners work together to create products as learning artifacts that can be shared locally or even globally

Inquisitive and Reflective: learners ask questions, identify problems, investigate and create solutions, and reflect to iterate on their designs.

As the work evolved throughout the years, Maker Ed and Digital Promise phased out the Maker Promise commitment campaign to better concentrate our efforts on creating and sharing high-quality resources to support Maker Champions. The partnership between Maker Ed and Digital Promise continues to see countless educators connecting with the organizations to start, sustain, and grow maker learning opportunities. Most importantly, feedback from Maker Champions and other stakeholders has directly influenced the work, providing key insights on the state of maker learning.

Maker Learning as a Microcosm

Schools and out-of-school-time organizations have always been microcosms of the communities in which they serve. As community hubs, social, economic, and political issues all converge in and around these learning institutions. If these learning institutions are microcosms of their communities, then maker learning—its adoption and implementation—is a microcosm of community-based making.

The last two years have been a time of intense societal challenge and change. We continue to see and hear from educators about the compounded effects of generational civil rights injustice, increased political turmoil, and the continued COVID-19 pandemic. The long-term impacts on education broadly, and maker learning in particular, are only beginning to be seen and felt.

COVID-19

Access to organized maker learning experiences was cut off overnight in March of 2020 as schools, libraries, museums, and other sites for maker learning closed their doors in response to the pandemic. As school-based learning moved online, significant numbers of students could not access or participate in school due to lack of broadband or device access, demands of caring for siblings or supporting family, and other reasons. According to a January 2021 Common Sense Media report, up to 12 million K-12 students were still lacking quality access to computing and/or high-speed internet , and the access gap disproportionately impacted communities of color and families experiencing poverty.

In addition to the continued pervasiveness of the Digital Learning Gap, the nature of maker learning—with its collaborative, hands-on,

MAKING ADJUSTMENTS

Responding to generational and immediate societal issues has required innovative solutions with rapid iteration of teaching and learning approaches.

Glamorous Gemz

Serving the community of Atlanta, GA, Glamorous Gemz is a non-profit organization focused on empowerment, mentorship, and impact with an emphasis on working with young girls from different racial, ethnic, and socioeconomic backgrounds. In her biography on the Glamorous Gemz website, Founder and Executive Director Danielle Rountree explains that "giving birth at an early age brought on the desire of helping others with fewer resources succeed and accomplish their goals."

With COVID-19 raging throughout the community, Rountree, alongside grant writer and Program Coordinator Danielle Brantley, knew it was imperative to modify Glamorous Gemz offerings to continue providing impactful programming to Atlanta youth.

Joining Digital Promise's Maker Learning @ Home cohort, the Glamorous Gemz team set out to bring to life Mission Possible, "an initiative to bridge the gap between the real world and the classroom by creating hands-on learning experiences that teach the whole child and create real-world impact." While learners were physically cut off from their classrooms, Rountree and Brantley developed and implemented Mission Possible "to teach learners the fundamentals of entrepreneurship by engaging them in hands-on activities that develop their academic and life skills."

Throughout the virtual program, learners work to design and launch their own businesses, applying academic concepts, 21st century skills, and the maker mindset. Along the way, participants are paired with mentors in similar fields as they work to start and scale their businesses with the hope of also saving for future college and/or career expenses.

Learn more about Mission Possible from Rountree and Brantley themselves in the June 2021 Nation of Makers NOMCON panel "Designing Maker Learning at Home."

material-rich process—makes it very difficult to transition into a fully remote environment. We saw and supported schools and organizations sending maker learning kits home during this time for students to continue making, but even these examples could never fully replicate the experience of making in-person and in collaboration with teachers and peers.

As severe an impact as the pandemic has had on making in schools, it had an even more severe impact on out-of-school learning environments, oftentimes the primary providers of maker learning experiences in a community. With museums and afterschool programs also being forced to close their doors in 2020, these organizations' budgets, staffing, and programming were devastated by COVID-19. Public libraries also saw program offerings contract as they put more resources into expanding broadband access in their communities and providing contactless borrowing options for their collections. According to the Johns Hopkins Center for Civil Society Studies Nonprofit Economic Data Project, more than 36 percent of jobs in the nonprofit arts, entertainment, and recreation sector were lost between February and December 2020, with estimates that it will take more than two years to fully recover those positions.

While maker learning experiences outside the home suffered, there is anecdotal evidence to suggest that making in the home may have increased. In fact, according to a media analysis study conducted at Drexel University, "creativity was an observable, communal, cultural response to the COVID-19 crisis." While essentially quarantined for weeks or months, many adults took up new hobbies like cooking, crafting, and home improvement. We expect that these experiences were often shared with children in the home.

Student Makers

Student Makers is a student-led nonprofit "on a mission to learn through making hands-on projects." Founded by then high school senior Anthony Neil Tan as the Maker Hub Club Initiative, Student Makers began as a way for his classmates and him to share their maker skills and knowledge with one another across various afterschool clubs. Asked about his motivation for beginning this work, Tan explained, "My...expertise is [organizing] and mobilizing students, why not create a platform for students to share their skills with others?"

In April 2020, Tan and his team recognized the disappointment that learners were experiencing as a result of shifting to distance learning. "We found that these clubs... were having difficulty. They had to cancel a lot of their events and were disappointed because the schools were closed down."

With Student Makers now supporting additional local clubs, the team thought deeply about how they could increase support for their students and, in response, shifted to a virtual format. Rather than solely supporting local clubs, Student Makers began a workshop series for broader audiences. By spring 2021, the series had grown to three workshops facilitated by students and included topics like 3D printing, Arduino programming, and hydroponic gardening. Each course is a free, eight-week virtual experience for U.S. learners in grades 7–11.

In addition to these workshops, Student Makers also launched a national community for learners to come together over video conferencing and online chat tools to support one another. Student Makers found that participants wanted opportunities to connect, learn about their peers' projects, and to be in community. "It's important that we keep the community at the heart of this," Tan explained. "That's what we're all about, supporting the student makers."

BIPOC MAKERS

Learning in the Making

Launched in April 2020 as response to the COVID-19 pandemic, Maker Ed's video series sees guest hosts of color invited on as "equal and valued partners and collaborators, so that they can tell their stories and showcase the amazing things they are making and doing!" Created by Linda Le and Dora Medrano Ramos, these video project guides emphasize interesting, accessible maker projects like making zines, stop motion animation, and self-care boxes. When asked in an interview for Maker Ed's blog, Le explains, "I am preparing for a world where our exploitative systems disappear and more resilient systems can take place, and I am learning from people who have come before us who have done this work. Plus, making is really fun, especially food. What better way to figure things out than to make stuff." Ramos, in her own featured post, adds, "I make because I want my son to grow up knowing he can make and learn anything he wants, just like his ancestors before him."

A few months later, Aáron Heard joined the team as Learning in the Making's Creative Architect, hosting the program and interviewing the guest hosts to learn more about their backgrounds, passions, and work. Heard's passion for maker learning is clear. "Making is agency, and I am committed to using my personal gifts to shape the critically conscious, agentic makers of the world—not only our youth, but all of us together."

Remake Learning Maker Learning Month

Throughout June 2020, Remake Learning's Maker Learning Collaborative spotlighted BIPOC maker educators and organizations in Southwestern Pennsylvania. Through a series of Facebook Live events, resource roundups, blogs, and maker educator profiles, the working group kicked off a renewed commitment to amplifying the work being done to support just, equitable maker learning opportunities in the region.

Socio-Political Unrest

In addition to COVID-19's effects on society, education, and maker learning, the last five years in the United States have also seen the impact of socio-political unrest. Hate in the forms of racism, xenophobia, sexism, homophobia, and transphobia have had an impact on the mental health and readiness for learning in and out of school, particularly for marginalized youth. As a response to the increased spotlight on human and civil rights injustices, many educators have looked to maker learning not only for its academic benefits, but also its potential for cultural relevance and responsiveness, social-emotional learning, and designing solutions to some of the very social ills contributing to the current unrest.

However, both makerspaces and schools have well-documented equity and inclusion challenges that, if not thoughtfully and intentionally addressed, will also manifest in maker learning. We must work to ensure maker learning experiences and spaces are inclusive and accessible. For maker learning to be equitable and just, learning opportunities and spaces must reflect the culture and values of those they serve while providing meaningful access to those who are typically excluded. Perhaps most importantly, we must ensure the burden of this work does not fall on the shoulders of BIPOC and LGBTQ+ educators.

In Digital Promise's "Pipeline and Retention of Teachers of Color: Systems and Structures Impeding Growth and Sustainability in the United States,"

a literature review focused on hiring and retaining teachers of color, it is raised that "studies have found that teachers of color disproportionately feel pressure to represent the needs of students of color (Simon & Johnson, 2015; Griffin & Tackie, 2016). While their ideas of innovations in curriculum or teaching are dismissed, teachers of color are still expected to address the needs of students of color in school regardless of whether this work is either recognized or paid separately (Education Trust, 2019).

We are hopeful that increased awareness of the importance of culturally responsive and sustaining pedagogies will create the conditions for more hands-on learning in which learners can fully embrace and define their own identities without the boundaries or limitations that have so often confined students experiencing marginalization.

While we have reasons to be optimistic about how the experience of the last few years could bring improvements to education in general and maker learning in particular, there is much still uncertain. Positive change will not happen on its own. Stakeholders across all points of access to maker learning must redouble efforts to ensure every child has the opportunity to access, participate in, and feel included in making experiences, and to ensure those experiences are personally and culturally affirming and enriching. In the following section is a synopsis of the work we have undertaken in the last few years to support educators as they create and facilitate maker learning experiences.

HOW WE RESPONDED

As the field continues to address the many challenges discussed in this section, we have sought to delicately balance responding to the needs of maker educators, initiating proactive positive disruption, and creating space for educators to breathe and heal. The following is a high-level overview of our partnership's contributions to the field. As we continue through uncertain times, Maker Ed and Digital Promise are committed to being a support for the maker learning community and beyond.

Edcamp: Maker Learning

Digital Promise shifted from providing support for in-person Edcamps to hosting Edcamp: Maker Learning, a fully online series of "unconference" style networking and professional learning experiences.

Maker Learning @ Home Cohort

Digital Promise facilitated the Maker Learning @ Home cohort, a six-month professional learning experience paired with financial support for a diverse group of educators to develop and facilitate home-based maker learning projects for their learners.

Approaches to Maker Education

Continuing to iterate on its flagship Approaches to Maker Education *workshop*, Maker Ed facilitated the four-day offering for the second summer in a row as a virtual cohort experience.

Learning in the Making

Maker Ed created and facilitated the live, online series Learning in the Making. Hosted by "BIPOC educators, creators, and makers as partners and collaborators," *Learning in the Making* was "designed to support educators and families with accessible hands-on learning experiences," by providing a list of thoughtfully sourced, cost-conscious tools and materials, and video content demonstrating the creative process.

For more information about these and other offerings, please refer to Appendix A: How we Responded.

What is the State of Maker Learning?

As schools and informal learning institutions began to reopen their buildings in 2021, continued pandemic protocols, uncertainties, and the emergence of the COVID-19 Delta variant have made it impossible to fully return to "normal." To better understand how maker learning is developing across learning environments, Digital Promise and Maker Ed conducted a national survey in May 2021. Two-hundred-ninety-seven educators from across the United States completed this survey. Survey questions were predominantly quantitative, with a few open-ended qualitative questions. Qualitative responses were coded to generate emerging and common themes. The survey questions were piloted among educators who attended Edcamp: Maker Learning events.

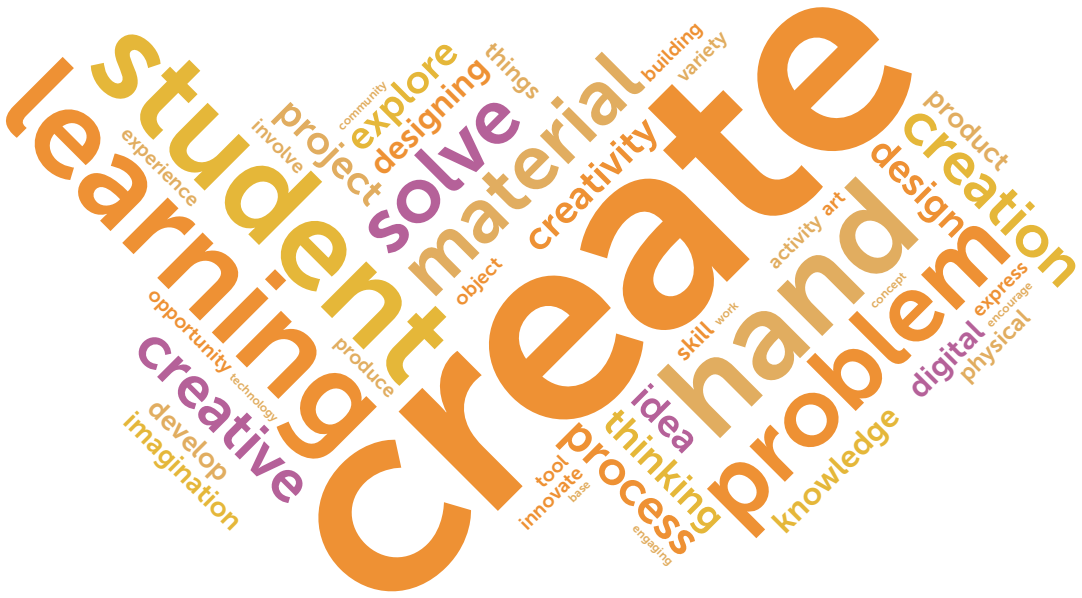
What follows are the emergent themes in maker learning, as supported by the survey data and additional insights from stakeholders engaged in maker learning programming. Also included are a number of needs the field has in order to continue growing in both scale and accessibility. For those needs, we offer recommendations and commitments to the field.

As the landscape evolves and we continue to analyze it, the responses to many of the survey questions beget new, deeper questions to refine our understanding of the field and the work to serve it. Where pertinent, numerous questions are posed that may generate beneficial datasets that will improve contributions in this space.

Clear, Inclusive Definitions Are Needed

Seeking clarity on how educators define "making" and "maker learning" was a focus of this survey. Over the years, it has become clear that these terms mean different things to different people. Most definitions highlighted one or two components of maker learning but were relatively narrow in scope. There were a number of responses that defined "making" by the tools being used or the end products being generated.

Word cloud of common language included in responses to the question: "How do you define making?"



It is worth noting that the difficulty of defining "making" and "maker learning" also suggest the breadth of what can be accomplished by making and through maker learning, and who can participate and feel included in making. The next steps in this work must be creating and amplifying clear, inclusive definitions while showcasing diverse examples of what it means to identify as a maker and engage in making and maker learning.

Listen to, Learn From, and Work With the Community

In addition to the term "making," the term "community" also brought forth a range of interpretations from respondents, particularly from school-based educators. Some educators' responses were focused at the more granular level of their individual learning spaces, while others spoke more generally of industry rather than the act of making. A number of responses signaled a disconnect between making at school and the broader community. Based on this dataset, we see that educators are struggling to articulate how their learning environments and experiences connect to the maker communities and ecosystems in their areas.

Word cloud of common language included in responses to the question: "What does making look like within your community?"

PIVOTAL PARTNERSHIPS

At the heart of the last five years of maker learning advocacy and support are the partnerships formed at both the local and national levels. Sustained, productive partnerships at the regional level require national organizations to work with and within local communities.

National Field Building Collaborative

Digital Promise and Maker Ed have worked alongside Citizen Schools, Fab Foundation, FabLearn, and Nation of Makers to create a field-building collaborative for maker learning organizations across the country. This alliance serves to leverage the reach of our national organizations and partnerships to support and work alongside local communities as hubs for making and maker learning.

Remake Learning

Remake Learning, the greater Pittsburgh region's education network, has embedded Digital Promise staff as the lead for their Maker Learning Collaborative working group. Partnerships like these not only contribute to local success in the targeted regions, but lead to the creation and amplification of resources that benefit others around the world.

Digital Promise worked directly with 10 Southwestern Pennsylvania school districts to create a Maker Learning Leadership cohort focused on growing maker learning opportunities in the region.

Emily Sanders, Director of Academics and Innovation for the New Castle Area School District (NCASD), saw profound impact from participation in this cohort experience. "Being a part of this cohort has not only acted as a catalyst for change in the classroom, but it has also helped school leaders to create a vision and prioritize efforts to maximize the effectiveness of a maker learning program."

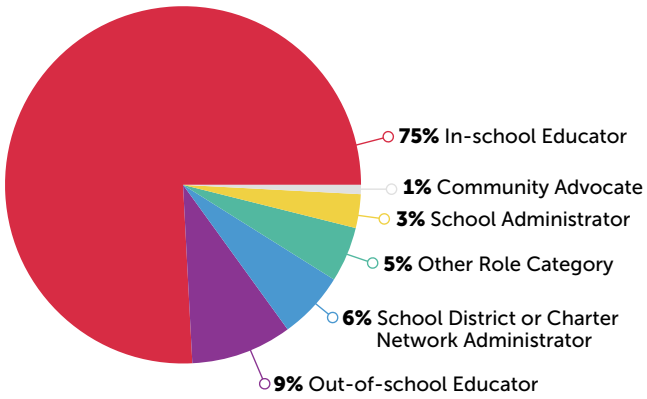
NCASD is also a member of Making Spaces, a research practice partnership between Children's Museum of Pittsburgh (CMP) and Maker Ed. This ecosystem model has served dozens of regional hubs as they raise awareness and secure resources to meaningfully integrate making within their communities.

In our work advocating for and supporting maker learning around the country, both Digital Promise and Maker Ed have seen that the most inclusive and sustainable maker learning experiences exist across a triad of sites. Strong and explicit connections between community members, out-of-school-time organizations, and K-12 institutions allow maker learning to progress from discrete experiences to cohesive learning ecosystems.

Maker Ed's Making Spaces program has worked to create learning ecosystems within communities to break down silos between K-12, out-of-school-time, museums, and families. To build on the success of programs like Making Spaces, the field must develop and implement robust, effective outreach strategies to better connect with and understand the needs of out-of-school-time organizations and the communities they serve. Out-of-school-time educators who responded to the survey also communicated a strong need for more opportunities to connect across their ecosystems. Schools seeking to strengthen their maker learning programs or better connect these programs with their broader community would be well served to identify and connect with the out-of-school maker learning providers in their area to coordinate and complement their collective efforts.

Out-of-school-time educators and administrators represented slightly more than 10 percent of survey respondents. This low participation level signals that we still have much work to do to better connect with these organizations and the stakeholders they serve. Stronger relationships between Digital Promise, Maker Ed, and the entire education triangle will create a better understanding of how our national organizations support local communities' maker learning work. In turn, that work can be amplified to the national level, creating opportunities to apply lessons learned while collaboratively improving existing programs and co-designing new programming and resources specifically for the out-of-school-time maker learning.

Role by Job Title



Additional Resources and Supports

Creating, curating, and amplifying maker learning resources has always been a central focus of our work. In each of our previous surveys, the feedback from participants highlighted their greatest needs as resources to support both professional and student learning. For the 2021 survey, respondents indicated that the most valuable resources Digital Promise and Maker Ed could offer to support their maker learning work are student project guides, online professional learning, and cross-curricular integrations.

We have seen the volume of available resources for maker learning grow year over year, but the need for more continues to be expressed. We see several reasons for this. First, as in-school educators seek to incorporate making into disciplinary classes, the resources that enable this must also connect to the academic standards they are responsible for teaching. Many maker learning resources do not currently do this.

Second, there is a growing awareness across the educational field that learning resources must be more aligned to supporting social and emotional learning and be culturally responsive and sustaining. Not all maker learning resources available contain or make explicit these connections and opportunities for all students to engage. Third, educators have needs for specific resources aligned to the ages and subjects they teach and to the individual students in front of them. While

COMMUNITY RESOURCES

Establishing Maker Learning Ecosystems

Building upon the need to forge stronger community connections, the Establishing Maker Learning Ecosystems cohort, composed of educators from different regions of the United States, will be launching and growing regional maker learning ecosystems with an emphasis on co-design with the communities they serve. The resources they develop will help to inform continued revisions to the Maker Learning Leadership Framework, providing additional Open Educational Resources for those seeking to build community-centered maker learning environments.

Maker Ed Resource Library

In response to community needs, Maker Ed's updated Resource Library will launch at the end of 2021, adding a host of new content, improved searchability, and most importantly, tagging resources that have been assessed and identified as equity-focused.

there are many supports, guides, and lesson plans available, they are not always easily searched, sorted, or categorized in relevant ways that make them findable by the educators who need them.

In a change from previous surveys, assessment tools were ranked as a significantly lower need than in years past. This surfaces questions we will seek to answer going forward, including: Why are these resources in lesser demand? Are the currently available resources enough? Are educators finding maker learning assessment resources more easily than other types of resources? Have priorities shifted in such a way that assessment of maker learning is less valued or required? These questions are pertinent not only for the aforementioned assessment tools but also for the broader request for resources. Across all datasets, "additional resources" consistently rank as a major need. Identifying more specific needs, barriers to resource access and methods to support educators with contextualizing those resources are all worthy areas of investigation.

Applying Lessons Learned While Continuing Innovation

Since 2019, COVID-19 has upended nearly every facet of life. As we continue to navigate the pandemic, it is vital that we not only address the gaps that were unearthed and further exacerbated but also apply pandemic-era solutions that can continue to serve educators and their communities.

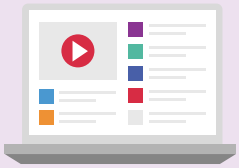
The ability to connect virtually was essential during the pandemic not only for social-emotional reasons, but it also allowed for educators navigating virtual learning to share struggles and solutions. Tapping into the global education community, educators were able to connect anytime with people anywhere. When in-person networking and learning can continue, they should. However, that does not mean virtual offerings should end. More than 60 percent of survey participants indicated online professional development is a highly sought resource that organizations can offer. We will continue to offer virtual events like Edcamp: Maker Learning and Maker Educator meetups, and we encourage peers across the global maker learning community to offer free and open virtual professional support and learning experiences.

STOP, START, CONTINUE

We asked survey participants what supports they plan to stop offering, what supports they were interested in continuing, and anything new that they want to start.

43 percent of respondents want to continue offering project guides as a support. 28 percent want to start. 29 percent noted that this was not relevant to their program at the moment. High interest in offering project guides as a resource is an alignment with the needs that educators had for resources that Digital Promise and Maker Ed could offer.

46 percent of respondents noted that at-home maker kits were not relevant to their current programming. This is an interesting finding as maker kits were a popular resource that began at the beginning of the pandemic.



39 percent indicated that they would continue to offer virtual facilitated experiences, and 49 percent indicated they would continue to offer video tutorials. This finding indicates that students in these communities will continue to have opportunities to engage in making while at home.

For maker learning access to truly be equitable, it must be able to happen anywhere at any time. While much attention has been paid to the learning experiences missed by students outside of school, there is little data available on what learning experiences may have taken place in the home that otherwise would not have. We hope that future research may explore these questions and give a fuller picture of the learning experiences of children during, and eventually after, the pandemic.

As we investigate the answers to these questions, carrying forward many of the programming modifications from the pandemic response will help to ensure maker learning is possible throughout entire communities, not restricted to a makerspace during scheduled operating hours. Lending equipment, live and on-demand learning content, and emphasizing process over product are just a few of the ways educators modified how they provide maker learning experiences. Documenting, analyzing, and distilling how they modified maker learning experiences to be more accessible will benefit educators everywhere.

The Next Five Years: A Community Effort

In the last five years, it has been established that maker learning is powerful learning. We know that making is a core human experience: a fabric of our being. It is clear that educators value maker learning as core to the learning experience. Over the last few years, we've seen making as a means for engaging with academic content, social-emotional learning, workforce development, equity and social justice efforts, skills development, and more. Our shared work—Maker Ed, Digital Promise, and all Maker Champions from schools and peer organizations—is to ensure maker learning continues to grow in all of these areas.

In the next five years, assuredly a time of continued rapid technological and societal change, maker learning has the opportunity to be at the center of how we learn, express ourselves, and create meaningful change around us. As a research-backed pedagogical approach, maker learning can avoid the pitfalls of becoming an educational fad; but to take hold, in the next five years we must work together to establish maker learning's permanent presence across learning ecosystems and communities.

THINGS TO MAKE, ACTIONS TO TAKE

The following are steps our stakeholders can take as we all work toward more inclusive, equitable, and powerful maker learning:

Highlight the makers in your life and help broaden the idea of who a maker is.

We want to use our platform to amplify the unique and diverse experiences, skills, and perspectives of people who engage in making. In the coming months, we will be launching a multimedia campaign featuring blog posts, live streams, on-demand media, and social content with the goal of broadening and strengthening the field of maker learning. We invite you to nominate creators, designers, writers, composers, and other creative educators doing incredible work to be highlighted through this upcoming Maker Learning Spotlight Initiative.

Share the resources and strategies you leverage to build community connections between schools, out-of-school time providers, and local organizations.

In this report, we recognize an opportunity and need to build stronger connections between communities and formal education. We know that stories from the field are essential to build a toolkit of strategies to support organizations to build meaningful and authentic relationships with one another. We invite you to join us in conversation in the following ways:

- On social media, tag @DigitalPromise and @MakerEdOrg using #MakerLearning
- Join us for Edcamp: Maker Learning in Fall 2021
- Reach out with this form to share best practices, lessons learned, and powerful stories

Share the successes you have had in your own community, the challenges you have experienced building new partnerships, and questions that you have for others seeking to do the same.

Participate in our one question survey to make project guides more accessible.

In our third year asking respondents of this survey what resources would be most valuable to their work, we continue to hear a high need for project guides to engage in making. From our work in the field, we know that there are many organizations, including our own, that have dedicated libraries with activities. We invite you to share with us how we can make these resources more accessible to stakeholders. What limitations and challenges are preventing you from engaging with these resources? Contribute your response to our one-question survey to provide recommendations for increasing access and use of student project guides and ideas.

Acknowledgments

Thank you to educators everywhere. Whether a Maker Champion for the last five years or just beginning your maker learning journey, your commitment to learners everywhere is something we must all recognize and celebrate.

To our survey respondents, thank you for your willingness to share your experiences with us.

This report was developed under the guidance of Nick Schiner, Kristyn Palazzolo, Maria Romero, and Josh Weisgrau of Digital Promise and Keyana Stevens, Briana James, Kyle Cornforth, and Aubrey Rawlins of Maker Ed. Kelly Mills supported the team with editing and advice.

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Appendix A: How Digital Promise and Maker Ed Support Maker Educators

Connection and Professional Development

In our Year 2 report, a key finding requiring action was the strong desire for more "opportunities for connection and professional development." With COVID-19 separating educators from one another and the students they serve, it became all the more important for our organizations to address this, even if it meant strictly in a virtual environment. Digital Promise shifted from providing support for in-person Edcamps to hosting Edcamp: Maker Learning, a fully online series of "unconference" style networking and professional learning experiences. These events brought together maker educators from around the world to discuss their challenges and successes, providing equitable maker learning opportunities to their learners wherever and whenever possible.

Maker Ed also shifted to focus on virtual professional development and community-building experiences. Responding to feedback from previous workshop attendees about the challenge of attending multi-day workshops, Maker Ed staff prototyped several shorter, more accessible learning events for educators interested in hands-on learning and equitable teaching practices. By planning these events on weekends and eliminating the cost to participate, the audience expanded, while facilitating more frequent events with shorter time commitments allowed for the coverage of a greater range of subject material. For example, in one event, educators focused on math education practices and the "math anxiety" that often affects learners who are in groups historically excluded from STEM.

Continuing to iterate on its flagship Approaches to Maker Education workshop, Maker Ed facilitated the four-day offering for the second summer in a row as a virtual cohort experience. These pivots to online professional learning have fostered increased confidence in offering this introductory workshop in both in-person and virtual capacities now, allowing Maker Ed to reach a wider audience of educators who would otherwise be excluded by the expense of traveling to the Bay Area to learn at the Community Studio.

To address the impact of learners being separated from the spaces and tools available in schools and community organizations, Digital Promise facilitated a six-month experience and provided financial support for a diverse group of educators to develop and facilitate home-based maker learning projects for their learners. With an emphasis on equity of access and opportunity for historically marginalized populations, the Maker Learning @ Home cohort teams from around the country learned with and from one another as they addressed the challenges facing their communities. This work will culminate with the publication of their home-based maker learning project guides as well as best practices for planning and facilitating similar learning experiences that will be available this Fall on Digital Promise's Maker Learning Initiative page.

Curriculum and Project Resources

Another major finding and recommendation from the Year 2 report was a "clearly expressed need for more resources for student projects and curriculum integration." To ensure educators have what they need to create equitable, quality maker learning experiences, our team has worked together and with our partner organizations to create, remix, and amplify resources and opportunities based on recommendations sourced from Maker Champions and additional stakeholders' feedback.

In 2019, Digital Promise published a major revision to the Maker Learning Leadership Framework "to help schools develop a pathway to sustainable, equitable, and powerful maker learning programs for all learners." Informed by and co-designed with educators from around the country, the revised Maker Learning Leadership Framework serves as a self-assessment tool, vision, and growth "roadmap" for educators. Given access to numerous first and third-party resources with meaningful contextualization, educators are able to effectively assess a learning organization's capacity to offer maker learning opportunities, including: identifying and enacting actionable steps to establish their program's vision, building support systems amongst stakeholders, teaching and learning with maker learning, and acquiring and allocating resources to actualize their work.

To support educators with the development of powerful maker learning experiences, Digital Promise also developed and facilitated *Maker Learning is Powerful Learning*, a blog and webinar series complemented by project development resources. During these sessions, educators worked together to learn best practices for the design and facilitation of projects that are personal and accessible, authentic and challenging, collaborative and connected, and inquisitive and reflective.

In keeping with the Year 2 Report's recommendations around educator needs, Maker Ed has also been working to update and improve its online Resource Library. So far, this process has focused on: providing a fresh, updated design; detailed and accurate search filters; a clear and cohesive evaluation rubric for resources; and greater inclusion of curated project guides, lesson plans, and activity ideas.

As the world began to shut down due to the COVID-19 pandemic, Maker Ed created and facilitated the live, online series *Learning in the Making*. Hosted by "BIPOC educators, creators, and makers as partners and collaborators," *Learning in the Making* was "designed to support educators and families with accessible hands-on learning experiences," by providing a list of thoughtfully sourced, cost-conscious tools and materials and video content demonstrating the creative process. Each episode is published with a standards-aligned English and Spanish project guide. To date, there have been 23 episodes of *Learning in the Making* with more on the way!

Appendix B: Survey Limitations

While analyzing the data from this survey and other maker learning programming, there was constant reflection on how our work impacted the results. Below are acknowledgments of this dataset's limitations:

Emphasis on Existing Maker Educators

When launching the call for survey participants, we targeted the National Week of Making for our primary promotional push. In addition, the terms "make," "making," "maker education," and "maker learning" were the only ways that we described the contents of what we were surveying.

Data Skews towards K-12

Eighty-four percent of survey participants work in K-12 schools or districts. While still statistically significant, our hope is to increase engagement with out-of-school-time educators and leaders to better understand the dynamics of maker learning that are specific to their organizations.

Majority of Respondents: Female, white

Sixty-three percent of participants self-identified as white and 84 percent as female. While consistent with the overall racial diversity amongst educators in the United States, it is critical to name that majority of responses are filtered through the white, female perspective.

Question Flaws

Recognizing question design flaws is also an important component in ensuring we continue to refine our data collection to paint a better picture of the maker learning landscape. Our questions regarding access to and quality of maker learning experiences were far too open-ended to produce a reliable picture. Better defining and highlighting what equitable access to maker learning is and how to effectively evaluate the quality of those experiences can inform better question design and, in turn, produce more actionable data.

Appendix C: 2021 Maker Learning Survey

Name	
Email Address	
Job Title/Role	

What role category does your job title fall under?
◯ School District or Charter Network Administrator (working with multiple schools)
◯ School Administrator (working in one school)
◯ In-school Educator (teacher, librarian, instructional coach, etc)
◯ Out-of-school Educator (public library, museum, after-school program, etc)
◯ Community Advocate (no direct teaching/facilitating with students)
◯ Additional Role Category

Organization Name	
Organization City	
Organization State	

Geographic Designation
◯ Rural
◯ Urban
◯ Suburban
◯ Industrial
◯ Other (please specify)

What is your gender identity?	

With what race/ethnicity do you identify?	

What percentage of your day-to-day job responsibilities involves your organization's maker learning program?										
◯ 0%	◯ 10%	◯ 20%	◯ 30%	◯ 40%	◯ 50%	◯ 60%	◯ 70%	◯ 80%	◯ 90%	◯ 100%

With which grade levels do you work or support?	
☐ Pre-K and earlier	☐ 9-10
☐ K-2	☐ 11-12
☐ 3-5	☐ Post 12th Grade
☐ 6-8	

Which of the following groups make up a large portion (over 30%) of the youth served by your organization?	
☐ White	☐ Asian
☐ Hispanic or Latino	☐ Native Hawaiian or Other Pacific Islander
☐ Black or African American	☐ N/A: I don't serve youth
☐ American Indian or Alaska Native	☐ Additional race or ethnicity (please specify):

Which of the following groups make up a large portion (over 30%)of the youth served by your organization?	
☐ Title I	☐ Special needs
☐ Low-income	☐ N/A: I don't serve youth
☐ English language learners	☐ None of the above

I facilitate making with learners during...
☐ Class time in core subject areas
☐ the school day as an extracurricular
☐ Outside of the school day

I have incorporated making into the following courses/subjects...	
☐ English/Language Arts	☐ Technology/Digital Literacy
☐ Mathematics	☐ Computer Science
☐ Science	☐ Dedicated Maker/STEAM course
☐ History/Social Studies	☐ Library
☐ Foreign Language	☐ Outside of coursework only
☐ Arts (Painting, Photography, Ceramics, etc.)	☐ Other (please specify)
☐ Performing Arts (Music, Dance, Theater, Choir, etc.)	

How do you define "making"?	

What does making look like within your community? (Examples:"Oakland has a rich history of street art," "New Mexico has a rich history of pottery", "Our school district has the most expansive STEAM curriculum in the Midwest.")

What are your program's top three priorities for the purpose of maker learning?	
☐ Skills development	☐ Interdisciplinary learning
☐ Knowledge learning (standards, science concepts, etc.)	☐ Social Justice and Equity
☐ Use of tools & technology	☐ Workforce Development
☐ Exploration of identity	☐ Other (fill in the blank)

To what extent do you agree with the following statement: The learners with whom I work have multiple access points to high-quality maker learning experiences.				
◯ Strongly Disagree	◯ Disagree	◯ Agree	◯ Strongly Agree	◯ N/A

Please elaborate on your choice. If you disagree, how could access be improved? If you agree, what factors have contributed to high access?

What is your current learning context?			
◯ In-person	◯ Remote	◯ Hybrid	◯ Other (please specify)

What are your three biggest challenges right now related to maker learning?		
☐ Capacity (within program/school time, educator bandwidth, fitting in with program/school priorities)	☐ Facilitation (of maker experiences)	☐ Advocating for Maker
☐ Resources (supplies) - resource access	☐ Resource overload	☐ Equity
☐ Transition to new learning context (hybrid/ in-person)	☐ Finding ideas	☐ Space
☐ New priorities	☐ Engaging families & community	☐ Getting started
☐ Learner engagement	☐ Assessment	☐ Implementation
☐ Other (please specify)		

In the 2021-2022 school year, what supports do you plan to STOP offering, what supports are you interested in CONTINUING, and is there anything new you have learned about that you want to START.				
	I plan to STOP offering this opportunity	I plan to CONTINUE offering this opportunity	I plan to START offering this opportunity:	Not applicable. This learning opportunity is not currently relevant to our program.
Project Guides	◯	◯	◯	◯
At home maker kits	◯	◯	◯	◯
Tool lending	◯	◯	◯	◯
Virtual facilitated experience	◯	◯	◯	◯
Video tutorials	◯	◯	◯	◯
Outside collaboration with schools	◯	◯	◯	◯
Outside collaboration with community partners	◯	◯	◯	◯
Other (please specify)	◯	◯	◯	◯

Please signal the top three resources Digital Promise and MakerEd could potentially offer to support you with continuing maker learning:
☐ Professional Development - in person
☐ Professional Development - online
☐ Student project ideas and guides
☐ Student project documentations resources and guides
☐ Assessment resources and guides
☐ Cross-curricular integrations resources and guides
☐ Resources for advocating for maker learning
☐ A space to connect with other maker educators
☐ A time to connect with other maker educators

Of the resource types selected, what would be most beneficial?

Data Sharing Confirmation
◯ I give permission for Digital Promise to share my response to this survey with its partner Maker Ed.

Would you be interested in participating in a follow-up interview or focus group to share more about your experience?

Is there anything else you would like to share with us related to your experience in education and the effects of COVID-19?